APMC

HOT ideas

A mathematical response to a piece of text

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Hot Ideas for this edition provided by Melinda Grey, a teacher education student from the University of South Australia.

Children's literature can enhance mathematics lessons by providing a meaningful context, demonstrating that mathematics develops from human experiences and contributes and aesthetic dimension to learning mathematics (Reys, Lindquist, Lambdin, Smith & Suydam, 2004). Some children's books provide a particularly rich source of mathematical activities and problem solving tasks. Rod Clement's *Counting On Frank* (1990) is an excellent example of such literature. *Counting On Frank* is written as a series of real life inspired snapshots of mathematical thinking. Showcased in words and pictures, the main character is constantly solving problems by considering mathematical concepts such as fractions, scale, volume, measurement, estimation, averages and spatial awareness as they might apply in daily life. For example, he calculates how long it would take to fill the entire bathroom with water, how much of his father would fit into the television and how many years it would take before peas knocked off his plate every dinner time would reach the level of the dining room table.

The book can be linked to various grades and strands in syllabus documents across Australia, including Data, Measurement, Number; Pattern and Algebra; Space and Geometry. The following activities are based on sections from *Counting On Frank* (Clement 1990). For each activity, read the relevant text to or with the children as a stimulus for solving the accompanying problem.

The main aim of each of these activities is that students collect, analyse and organise information, communicate ideas and information, work with others, use mathematical ideas and techniques, and solve problems.

Activity 1

> I calculate that only one Dad would
> fit inside our big television,
> but only one-tenth of him would fit
> in Mum's portable.
> Mum said she would prefer the top part
> because Dad's feet smell. (Clement 1990, p.7)

Problem

A life-size manikin of yourself is being shipped overseas to be used as a shop model. Due to international regulations, your manikin cannot be shipped already assembled. You need to disassemble your manikin and store it in a minimum of three boxes, ready for shipping. Working in pairs, investigate the following:

- How many parts will you break your manikin into and why?
- How would you describe these parts as fractions of your manikin's body?
- How would you describe these parts as percentages of your manikin's body?
- What sizes and shapes will your boxes need to be in order to accommodate your manikin?

Hint: Remember that the less space your manikin takes up, the more manikins can be shipped at once.

Resources

- Photocopies of the problem for reference
- Measuring equipment (tapes, rulers etc)
- Textas, pens, pencils
- Butcher's paper, working paper
- Calculators

Further activities

For those who are not sure where to start:

Consider which materials you might use to measure your partner from head to toe:

- What would you use and why?
- What else might you use?
- How would you record your findings?

Measure the length of your arms, legs and torso. Now measure your knee to your foot and your elbow to the tip of your fingers.

- What do you notice?
- Are there similarities and differences between your measurements and your partner's measurements?

For those who finish quickly

Further points to consider:

- How much space does your disassembled boxed manikin take up?
- What size cargo hold would you need to fit a class of manikins like yours?
- What about a school of manikins like yours?

Activity 2

We've got a gum tree in our garden.
It grows about two metres every year.
If I had grown at the same speed I'd now be
sixteen metres tall!
I wouldn't mind really, except that
I'd never get clothes to fit. (Clement 1990, p.9)

Problem

How big would you be if you were ten times bigger than you are? How big would your desk be? How does that compare to the size of the classroom? How much material would it take to make you a shirt?

How small would you be if you were ten times smaller than you are? How small would your desk be? How might you represent this on graph paper? Could you draw it as though you were looking down on it? What other objects around the classroom can you draw as if they were ten times smaller and you were looking down on them?

Resources

- Photocopies of the problem for reference
- Measuring equipment (tapes, rulers etc)
- Graph paper (1cm by 1cm squares)
- Calculators
- Textas, pens, pencils
- Butcher's paper, working paper

Further activities

For those who are not sure where to start
Select an object from your pencil case. Trace around this object on your graph paper. Measure your tracing and make a note of your findings. Now trace around the object a further nine times, making sure your tracings are next to each other. Measure your total. What do you notice? Do the same with another object from your pencil case. What do you notice? Might you be able to apply what you have discovered to a bigger object?
For those who finish quickly
Make three-dimensional 1:10 scale models of the objects within the classroom.

Activity 3

I don't mind having a bath — it gives me time to think.
For example, I calculate it would take eleven hours and forty-five minutes to fill the entire bathroom with water. That's with both taps running.
(Clement 1990, p.11)

Problem

How much water would it take to fill this classroom?

Resources

- Measuring equipment (tapes, rulers, jugs, trundle metres etc)
- Textas, pens, pencils
- Butcher's paper, working paper
- Calculators
- Ice cream bucket/other vessel to contain water

Further activities

For those who are not sure where to start
Pairing up and using a measuring jug, investigate how much water it takes to fill an ice cream container with water. How big is the ice cream container? How many ice cream containers could you fit along the wall of the classroom? How many ice cream containers do you think it would take to get to the ceiling? If the ice cream container fits 1 litre of water, how many litres might it take to fill the whole room?
For those who finish quickly
How much water would it take to fill the building to which your classroom belongs?

References

Clement, R. (1990). *Counting On Frank*. Angus & Robertson: Pymble NSW.

Reys, R., Lindquist, M., Lambdin, D., Smith, N. & Suydam, M. (2004). *Helping Children Learn Mathematics (7th ed.)*. John Wiley & Sons.